

Myrtle Rust arrival in Australia – Archival material (Sept 2010)

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Myrtle Rust arrival in New South Wales

A rust disease attributed to the South American fungal pathogen *Uredo rangelii* (Myrtle Rust) was reported on a commercial plant production property on the New South Wales Central Coast in April 2010. As at 20 September 2010, it has been found on cultivated Australian native plants at 32 sites, with the main cluster in the Gosford/Wyong area but extending from just north of Wollongong to the NSW mid-North Coast. As of that date, all are in wholesale and retail nurseries, or on properties linked to these through plant movements. No infection of wild plants in nearby bushland has yet been found in precautionary surveys in the Gosford/Wyong area.

Myrtle Rust has not previously been known in Australia. It attacks a range of species in the family Myrtaceae, and appears to have a wide range of potential host species. Since April it has been found on eight Australian native myrtaceous species in cultivation (in the genera *Agonis*, *Callistemon*, *Gossia* [*Austromyrtus*], *Leptospermum* *Syncarpia*, *Syzygium*, and *Tristania*). Myrtle Rust was initially thought not to affect eucalypts (the genera *Angophora*, *Corymbia*, and *Eucalyptus*), but recent laboratory testing by artificial infection (<http://www.daff.gov.au/aqis/quarantine/pests-diseases/myrtle-rust/myrtle-rust-qa>, accessed 16 Sept. 2010) has identified a number of eucalypts as potentially susceptible: *Eucalyptus agglomerata* (Blue-leaved Stringybark), *E. cloeziana* (Gympie Messmate), *E. grandis* (Flooded Gum), *E. pilularis* (Blackbutt), *E. globulus* (Tasmanian Blue Gum), plus additional taxa in *Agonis*, *Leptospermum*, *Melaleuca*, and *Syzygium*.

Why is this a big problem?

Myrtle Rust is known to cause disease in several genera of Myrtaceae native to Australia. It is also very closely related to (and may prove to be simply a variant of) another South American pathogen, *Puccinia psidii* (Eucalypt/Guava Rust), which is known from several studies overseas to attack a very wide range of exotic and Australian myrtaceous species, including many eucalypts. Work to review the taxonomy and epidemiology of the group is underway.

Both Rusts produce lesions on the new leaves and shoots of susceptible species, which develop into yellow pustules and spore masses. Severe infection may cause death of new growth and seedlings, distortion of plant habit, and sometimes death of the plant. The fruits of soft-fruited species are also prone to infection. The symptoms, especially at the yellow pustule stage, are not easily mistaken – there are very few other rusts that affect plants of the Myrtaceae, and none of them are common or widespread. To see photos of the symptoms of Myrtle Rust on Australian species, see www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust/myrtle-rust-images.

While the documented host range for Myrtle Rust (*U. rangelii*) differs from that of Eucalypt/Guava Rust (*P. psidii* in the strict sense), and is as yet much narrower, this may be only for want of prior study. In the current NSW outbreak, Myrtle Rust has already infected cultivated host plants in seven native Australian genera, and the confirmed host species for *U. rangelii* (Myrtle Rust) here and overseas already represent seven of the 17 recognised tribes in the Myrtaceae (following the classification of Wilson *et al.* 2005). This suggests a potential for a wide range of new hosts if the pathogen naturalises in Australia. The Myrtle Rust National Management Group is coordinating further host testing of the Central Coast pathogen.

The Australasian Plant Pathology Society, in a media release of May 2010, stated that “there is a real concern that the disease caused by *Uredo rangelii* (myrtle rust) will not be significantly different to that caused by *Puccinia psidii* (guava rust)”.

Eucalypt/Guava Rust (*Puccinia psidii* in the strict sense), is not yet recognised as occurring in Australia. It has however been regarded for several years as a major threat to Australian myrtaceous species. It is identified as a disease of significance in the *National Nursery and Garden Industry Biosecurity Plan* (Plant Health Australia 2008) and the *National Plantation Timber Industry Biosecurity Plan* (Plant Health Australia 2007), and a *Contingency Plan* has been developed by the Commonwealth Government (Plant Health Australia 2009).

Eucalypt/Guava Rust (*P. psidii*) has been assessed (Plant Health Australia 2008, 2009) as having a high potential for entry to Australia, a high establishment potential, a high-to-extreme spread potential, a high environmental impact, and a high-to-extreme economic impact.

In NSW, a Preliminary Determination has been made for ‘Introduction and establishment of Exotic Rust Fungi of the order Uredinales pathogenic on plants of the family Myrtaceae’ as a Key Threatening Process under the NSW *Threatened Species Conservation Act 1995* (NSW Scientific Committee 2010), available at:

<http://www.environment.nsw.gov.au/committee/preliminarydeterminationsbydate.htm>, open for public comment to 12 Nov. 2010]. This determination covers all exotic rusts known to infect myrtaceous plants, including *Puccinia psidii* and *Uredo rangelii*. It provides a general review of the conservation implications, albeit mainly from an NSW point of view.

Eucalypt/Guava Rust (*P. psidii*) causes moderate to severe rust disease in overseas plantations of Guava (*Psidium*) and of Australian-origin eucalypts, and has been found to establish on a wide range of Australian-origin Myrtaceae species under field and/or laboratory conditions, including genera that are ecologically important in Australian ecological communities such as *Angophora*, *Callistemon*, *Corymbia*, *Eucalyptus*, *Kunzea*, *Melaleuca*, *Syncarpia* and *Syzygium*.

The potential scale of the problem

Australia has about 2253 native species of plants belonging to the family Myrtaceae (about 10% of Australia's native flora). They are an ecologically important and often dominant part of many Australian ecological communities, notably eucalypt-dominated forest and woodland systems, but also including rainforests, shrublands, and heaths. At the current stage of knowledge, most native myrtaceous species occurring in high-risk climatic regions should be considered at risk from exotic rusts of the *Puccinia psidii* group.

Myrtle Rust (*Uredo rangelii*) is thought to share many biological and ecological characteristics of Eucalypt/Guava Rust (*Puccinia psidii*). Spores of the latter are readily dispersed by wind, by movement on infected plant material, as contaminants in pollen, by movement of vehicles and equipment, and on clothing and personal effects of people. Movement of the pathogen in plant seed batches, by honeybees, and in the transport of bee hives is possible.

Puccinia psidii (Eucalypt/Guava Rust) is regarded by the Commonwealth Primary Industries Ministerial Council as "one of the most serious threats to Australian production forests and natural ecosystems" (Commonwealth of Australia 2006). It has a potential to cause direct mortality in the estimated 10% of all Australian native forest plant species (and the great majority of dominant species) that belong to the family Myrtaceae, and with indirect effects that may include habitat loss for native fauna and flora, reduced regeneration and recruitment of young plants, greater impact of fire, and canopy leading to erosion, reduced water quality, reduced water retention in soil and vegetation, and potentially large losses to the forestry industry.

Areas of Australia likely to be at high risk of establishment of Eucalypt/Guava Rust (*Puccinia psidii*) include most of the eastern seaboard, the eastern fall of the Great Dividing Range, and coastal areas in the Top End of the Northern Territory, all depending on presence of suitable host species and microhabitat. A zone of lower risk extends onto the western slopes of the Divide. The area of highest risk in NSW is the coastal zone from the Illawarra to the Queensland border. There is as yet no modelling specifically for the putatively different Myrtle Rust (*Uredo rangelii*) but the working assumption is that the risk area is similar.

Several plant species susceptible to Eucalypt/Guava Rust (*P. psidii*) infection, are structurally or floristically important in one or more ecological communities that occur in the high-risk area eastern Australia. These species include (among many others): *Angophora costata* (Smooth-barked Apple), *Corymbia citriodora* (Lemon-scented Gum), *C. maculata* (Spotted Gum), *Eucalyptus botryoides* (Bangalay), *E. grandis* (Flooded Gum), *E. moluccana* (Grey Box), *E. paniculata* (Grey Ironbark), *E. pilularis* (Blackbutt), *E. robusta* (Swamp Mahogany), *E. saligna* (Sydney Blue Gum), *E. tereticornis* (Forest red Gum), and *Syncarpia glomulifera* (Turpentine). See NSW Scientific Committee (2010) for a more exhaustive list of variably susceptible species, but note that degree of susceptibility for a great many species is yet to be determined.

Can these rust diseases be controlled?

Possible means of physical, chemical and biological control of Eucalypt/Guava Rust (*P. psidii*) under Australian conditions are canvassed in the *Threat Specific Contingency Plan* –

Guava (eucalyptus) rust Puccinia psidii (Plant Health Australia 2009), but these options are limited and only likely to be effective for artificial conditions – nurseries, gardens, and perhaps plantations. There are no likely control options for wild areas, other than prevention of arrival, or detection and eradication at a very early stage of arrival. Variable levels of susceptibility and resistance are known for those Australian species studied overseas, but these have involved only a narrow range of genotypes of both host and rust. It is likely that all the same considerations would apply to the putatively separate species Myrtle Rust (*Uredo rangelii*).

What is being done?

When the new rust infection was first reported in April, a consultative committee was convened on 27 April 2010, as called for by the Commonwealth's *Threat Specific Contingency Plan – Guava (eucalyptus) rust Puccinia psidii* (Plant Health Australia 2009), but a Scientific Advisory Panel (SAP) was not formed. The consultative committee decided that Myrtle Rust could not be eradicated, although the disease was at that stage known only from a very few nursery-type properties, and this was agreed to by the Myrtle Rust National Management Group (NMG – the peak body responsible). The Emergency Response was stood down on 30th April.

The process from that point is not well documented publicly, but disquiet from scientific and nursery industry circles, especially after the imposition of regional quarantine orders for the affected area and import restriction orders by some other States, seems to have been responsible for the reconvening some weeks later of the consultative committee and a renewed commitment to possible eradication. The NSW Department of Industry and Investment is leading the activities to control Myrtle rust under the direction of the NMG. The NMG is comprised of the chief executive officers of the national and state/territory departments of agriculture and primary industries across Australia, representatives of peak industry bodies and Plant Health Australia. The group is chaired by the Secretary of the Australian Government Department of Agriculture, Fisheries and Forestry, Dr Conall O'Connell.

Information sources for the national and State response effort are listed below.

What to do if you see a myrtaceous plant with brown lesions or yellow pustules on leaf or stems

Do NOT attempt to take a sample (the spores are too easily spread). If possible, take photographs without disturbance, make a careful note of location (or a precise GPS reading), and report your sighting immediately to one of the hotlines listed below. Also ask their advice about decontamination precautions for clothing, footwear, equipment and vehicles.

FURTHER INFORMATION AND LINKS

Note: Internet addresses shown are current as at 16 Sept. 2010. Scientific papers not freely available over the web may be available for study through the libraries of State herbaria, botanic gardens, or departments of forestry and primary industry or agriculture.

National Exotic Plant Pest Hotline for reporting sightings: 1800 084 881

State contacts

- South Australia: 1300 666 010
- Tasmania: 03 6233 3352
- Western Australia: 08 9334 1800
- Victoria: 13 61 86
- Queensland: 13 25 23
- Northern Territory: 08 8999 2118
- NSW: contact the Quarantine Domestic Hotline 1800 084 881

Fact sheets, identification aids, and report hotlines

COMMONWEALTH

‘Myrtle Rust Questions and Answers’. Australian Quarantine and Inspection Service website: <http://www.daff.gov.au/aqis/quarantine/pests-diseases/myrtle-rust/myrtle-rust-qa> (accessed 16 Sept. 2010).

‘Fact sheet: Exotic threats of plantation timber: Eucalyptus Rust’. Plant Health Australia (undated) [Available at: www.planthealthaustralia.com.au – select QuickLinks ‘PI’ then search for ‘guava’ and click, then scroll down and click on ‘FS’. Accessed 16 Sept. 2010]

NEW SOUTH WALES

‘Myrtle Rust – Current situation summary’. Periodically updated – NSW Industry & Investment website: <http://www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust> (accessed 16 Sept. 2010). Links to a full situation summary, FAQs, quarantine and hygiene information, reporting and Weekly Update bulletins.

‘Myrtle rust – *Uredo rangelii*’. PRIMEFACT 1017 (June 2010). NSW Industry & Investment (2010): [Available at: www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust/uredo-rangelii (accessed 16 Sept. 2010)]

‘ID-sheet: Identification of Myrtle rust (*Uredo rangelii*)’, v. of 19 August 2010. NSW Industry & Investment (2010). [Available at: www.dpi.nsw.gov.au/data/assets/pdf_file/0009/337374/identification-myr... (accessed 16 Sept. 2010)]

‘Plant Diseases (Myrtle Rust Quarantine Area) Notification 2010 No. 2 (18 Aug. 2010). NSW Government Gazette’ [available at http://www.dpi.nsw.gov.au/data/assets/pdf_file/0003/344415/Myrtle-rust-notification-2010-number2.pdf (accessed 16 Sept. 2010)]

WESTERN AUSTRALIA

‘Pest alert – Myrtle rust (*Uredo rangelii*)’. Available at Department of Agriculture & Food website: http://www.agric.wa.gov.au/PC_94039.html (accessed 16 Sept. 2010)]. Includes links re interstate plant import restrictions.

QUEENSLAND

'Myrtle rust'. [Available at Dept of Employment, Economic Development & Innovation website: http://www.dpi.qld.gov.au/4790_17185.htm (accessed 16 Sept. 2010)]. Includes general info, photos, and Q&A.]

TASMANIA

'Current Biosecurity Threats – Myrtle Rust'. [Available at Dept of Primary Industries, Parks, Water and Environment website:

<http://www.dpiw.tas.gov.au/inter.nsf/WebPages/MCAS-7FH8FU?open> (accessed 16 Sept 2010). Includes link to Formal notice re prohibition of Myrtaceae imports.]

VICTORIA

'Myrtle rust – have you seen it?' [Available at Department of Primary Industries website: <http://new.dpi.vic.gov.au/home> (search on 'Myrtle') (accessed 16 Sept. 2010). Includes link to info on restriction of interstate imports.]

NATIONAL PROFESSIONAL

'*Puccinia psidii* Winter – Pathogen of the Month, May 2010'. Australasian Plant Pathology Society website: www.australasianplantpathologysociety.org.au/Regions/POTM/index.htm, accessed 10 August 2010)

APPS (2010b) Guava Rust – by any other name, may be just as bad: Australia needs to do more now. [Media release, undated but c. June 2010, by the Australasian Plant Pathology Society. Available at: www.australasianplantpathologysociety.org.au/Press_Releases/index.html, (accessed 16 Sept. 2010)]

Australian contingency plans and impact assessments for Eucalypt/Guava Rust

Commonwealth of Australia (2006) Contingency planning for Eucalyptus Rust. In 'Records and Resolutions of the Primary Industries Ministerial Council' [PIMC 10, 20 April 2006]: 100-104. (Available at: www.mincos.gov.au/publications#meeting_records, accessed 16 Sept. 2010).

Plant Health Australia (2007) National Plantation Timber Industry Biosecurity Plan. Plant Health Australia, Deakin ACT. [Available at: www.planthealthaustralia.com.au/go/phau/biosecurity/plantation-timber (accessed 16 Sept. 2010)]

Plant Health Australia (2008) National Nursery and Garden Industry Biosecurity Plan Version 2 (March 2008). Plant Health Australia, Deakin ACT. [Available at: www.ngia.com.au (select 'Environment' then 'Biosecurity'), (accessed 16 Sept. 2010).]

Plant Health Australia (2009) Threat Specific Contingency Plan – Guava (eucalyptus) rust *Puccinia psidii*. Industry biosecurity plan for the nursery and garden industry. Plant Health Australia, Deakin ACT. [Available at:

www.planthealthaustralia.com.au/go/biosecurity (select ‘Pest Information Document Database’, then ‘Nursery and Garden’), (accessed 16 Sept. 2010).]

NSW Scientific Committee (2010) ‘Introduction and establishment of Exotic

Rust Fungi of the order Uredinales pathogenic on plants of the family Myrtaceae’. Preliminary Determination as a Key Threatening Process under the NSW Threatened Species Conservation Act 1995. [Available at: <http://www.environment.nsw.gov.au/committee/preliminarydeterminationsbydate.htm>. Open for public comment to 12 Nov. 2010]

Current classification of the plant family Myrtaceae (to genus level)

Wilson PG, O’Brien MM, Heslewood MM, Quinn CJ (2005) Relationships within Myrtaceae *sensu lato* based on a matK phylogeny. *Plant Systematics and Evolution* 251: 3-19 [PDF download available free at <http://www.springerlink.com/content/0378-2697/251/1/>]

Scientific references specifically on Myrtle Rust (*Uredo rangelii*)

Carnegie AJ, Lidbetter JR, Walker J, Horwood MA, Tesoriero L, Glen M, Priest MJ (2010) *Uredo rangelii*, a taxon in the guava rust complex, newly recorded on Myrtaceae in Australia. *Australasian Plant Pathology* 39(5), 463-466 [Open access download available at www.publish.csiro.au/nid/39.htm]

Simpson JA, Thomas K, Grgurinovic CA (2006) Uredinales species pathogenic on species of Myrtaceae. *Australasian Plant Pathology* 35(5): 549-562

[free PDF download available at <http://www.publish.csiro.au/nid/41/issue/3073.htm>]

Selected scientific references specifically on Eucalypt/Guava Rust (*Puccinia psidii*), or myrtaceous rusts in general

Booth TH, Old KM, Jovanovic T (2000) A preliminary assessment of high risk areas for *Puccinia psidii* (Eucalyptus Rust) in the Neotropics and Australia. *Agriculture Ecosystems and Environment* 82: 295-301 [not available on line]

Glen M, Alfenas AC, Zuza EAV, Wingfield MJ, Mohammed C (2007) *Puccinia psidii*: a threat to the Australian environment and economy – a review. *Australasian Plant Pathology* 36(1): 1-16 [free PDF download available at www.publish.csiro.au/nid/41/issue/3714.htm]

Grgurinovic CA, Walsh D, Macbeth F (2006) Eucalyptus rust caused by *Puccinia psidii* and the threat it poses to Australia. *EPPO Bulletin* 36: 486–489

[Pay for reprints at <http://www.wiley.com/bw/journal.asp?ref=0250-8052>]

Junghans DT, Alfenas AC, Brommonshenkel SH, Oda S, Mello EJ, Grattapaglia D (2003) Resistance to rust (*Puccinia psidii* Winter) in *Eucalyptus*: mode of inheritance and mapping of a major gene with RAPD markers. *Theoretical and Applied Genetics* 108: 175-180. [free PDF download available at www.springerlink.com/content/u2fnkcgmb53e0nwa/fulltext.pdf]

Killgore EM, Heu RA (2005) Ohia Rust *Puccinia psidii* Winter. State of Hawaii, Department of Agriculture, New Pest Advisory no 05-04 (updated December 2007). [Free PDF download available at: <http://hawaii.gov/hdoa/pi/ppc/npa-1/npa05-04-ohiarust.pdf>]

Langrell SRH, Tommerup IC, Zuza EAV, Alfenas AC (2003) PCR based detection of *Puccinia psidii* from contaminated *Eucalyptus* germplasm – implications for global biosecurity and safeguarding commercial resources. In ‘8th International Congress of Plant Pathology’: 57 [not available online?]

Langrell SRH, Glen M, Alfenas AC (2008) Molecular diagnosis of *Puccinia psidii* (guava rust) – a quarantine threat to Australian eucalypt and Myrtaceae biodiversity. *Plant Pathology* 57(4): 687-701 [free PDF download available at <http://onlinelibrary.wiley.com/doi/10.1111/ppa.2008.57.issue-4/issuetoc>]

Simpson JA, Thomas K, Grgurinovic CA (2006) Uredinales species pathogenic on species of Myrtaceae. *Australasian Plant Pathology* 35: 549-562

[free PDF download available at <http://www.publish.csiro.au/nid/41/issue/3073.htm>]

Tommerup IC, Alfenas AC, Old KM (2003) Guava rust in Brazil – a threat to *Eucalyptus* and other Myrtaceae. *New Zealand Journal of Forestry Science* 33: 420-428 [free PDF download available at <http://www.nzffa.org.nz/images/design/guava-rust.pdf>]

Zuza EAV, Couto MMF, Lana VM, Maffia LA (2010a) Vertical spread of *Puccinia psidii* urediniospores and development of eucalyptus rust at different heights. *Australasian Plant Pathology* 39(2): 141-145 [free PDF download available at <http://www.publish.csiro.au/nid/41/issue/3073.htm>]

Zuza EAV, Couto MMF, Lana VM, Maffia LA (2010b) Myrtaceae species resistance to rust caused by *Puccinia psidii*. *Australasian Plant Pathology* 39(5): 406-[free PDF download available at <http://www.publish.csiro.au/nid/41/issue/3073.htm>]